

CLAIMS

1. Network architecture for enabling a first network terminal connected in a call with a second network terminal via a first circuit, to purchase calling time during the call, the network architecture comprising:

5 a first network node connected to said first network terminal;
 a second network node connected to said second network terminal;

 an account management node connected to said first network node, said account management node managing a pre-paid account associated with said first network terminal; and

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 a call management node connected to said first network node via a signaling link, to said account management node via a communication link, and to said second network node, said call management node connecting said first network terminal with said account management node over a second circuit, while said second network terminal is on hold, whereby said first network terminal purchases said calling time, said call management node disconnecting said first network terminal from said account management node, when the call-credit of said pre-paid account is positive, thereby allowing said first network terminal to resume said call.

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2. The network architecture according to claim 1, wherein said account management node monitors said call-credit during said call, and

25 wherein said account management node sends an indication to said call management node, that said call-credit is approaching zero, when said account management node detects that said call-credit is approaching zero.

3. The network architecture according to claim 1, wherein said call management node sends a modified message to said first network node, for said first network node to allocate said second circuit,

5 wherein said call management node sends a command to said account management node, for said account management node to allocate said second circuit, and

10 wherein said call management node produces said modified message by replacing an originating identification code respective of said first network terminal, with a unique identification code respective of said account management node, and a destination identification code respective of said second network terminal, with said originating identification code.

- 15 4. The network architecture according to claim 1, wherein said first network node sends a call waiting message to said first network terminal, following the receipt of said modified message by said first network node, to notify said first network terminal that said account management node is calling said first network terminal, and

wherein said call waiting message comprises:

20 an audio message;
a graphical message; and
a textual message.

- 25 5. The network architecture according to claim 1, wherein said call management node sends a modified message to said first network node, for said first network node to dis-allocate said second circuit,

wherein said call management node sends a command to said account management node, for said account management node to dis-allocate said second circuit, and

30 wherein said call management node produces said modified message by replacing a destination identification code respective of

said second network terminal, with a unique identification code respective of said account management node.

5 6. The network architecture according to claim 1, wherein said account management node sends an indication to said call management node that said call-credit is positive, when said account management node detects that said call-credit is positive.

10 7. The network architecture according to claim 1, wherein said call management node includes a data structure for associating signaling destination information respective of said first network node, with signaling destination information respective of said account management node.

15 8. The network architecture according to claim 7, wherein said data structure includes signaling destination information having at least the fields selected from the list consisting of:

first network node point code;
account management node point code;
20 first network node resource identification;
first network node circuit identification code;
account management node resource identification;
account management node circuit identification code;
first network terminal mobile identification number;
25 resource group identification; and
trunk identification.

30 9. Network architecture for terminating a first call between a first network terminal and a second network terminal over a first circuit, when a call-credit of a pre-paid account of the first network terminal is zero, the network architecture comprising:

a first network node connected to said first network terminal;

a second network node connected to said second network terminal;

5 an account management node connected to said first network node, said account management node managing a pre-paid account associated with said first network terminal; and

10 a call management node connected to said first network node via a first signaling link, to said second network node via a second signaling link, and to said account management node via a communication link, said call management node disconnecting said second network terminal from said second network node, by sending a first modified message to said second network node to dis-allocate said first circuit, said call management node establishing a second call between said first network terminal and said account management node, for said account management node to send an explanatory message to said first network terminal for terminating said first call, and said call management node terminating said first call, when said call-credit is zero,

15 wherein said call management node produces said first modified message by replacing a destination identification code respective of said second network terminal, with a unique identification code respective of said account management node.

20 10. The network architecture according to claim 9, wherein said account management node monitors said call-credit during said first call, and

wherein said account management node sends an indication to said call management node that said call-credit is zero, when said account management node detects that said call-credit is zero.

30 11. The network architecture according to claim 9, wherein said call management node establishes said second call, by sending a second

modified message to said second network node to re-allocate said first circuit, receiving a first signaling message from said second network node that said second network node has allocated a second circuit associated with said first circuit, and sending a first command to said account management node to allocate said second circuit, and

wherein said call management node produces said second modified message by replacing said destination identification code, with said unique identification code.

12. The network architecture according to claim 11, wherein said call management node terminates said first call and said second call, by sending a third modified message to said second network node to dis-allocate said second circuit, sending a second command to said account management node to dis-allocate said second circuit, receiving a second signaling message from said second network node that said second network node has dis-allocated said first circuit, and sending a fourth modified message to said first network node to dis-allocate said first circuit, and

wherein said call management node produces each of said third modified message and said fourth modified message, by replacing said destination identification code with said unique identification code.

13. The network architecture according to claim 9, wherein said call management node establishes said second call, by sending a second modified message to said second network node to re-allocate said first circuit, receiving a first signaling message from said second network node that said second network node has allocated a second circuit associated with said first circuit, sending a third modified message to said first network node to allocate said second circuit,

receiving a second message from said first network node that said first network node has allocated a third circuit associated with said second circuit, and sending a first command to said account management node to allocate said third circuit, and

5 wherein said call management node produces each of said second modified message and said third modified message, by replacing said destination identification code with said unique identification code.

10 14. The network architecture according to claim 13, wherein said call management node terminates said first call and said second call, by sending a fourth modified message to said first network node to dis-allocate said third circuit, sending a second command to said account management node to dis-allocate said third circuit, receiving
15 a third signaling message from said first network node that said first network node has dis-allocated said second circuit, sending a fifth modified message to said second network node to dis-allocate said second circuit, receiving a fourth signaling message from said second network node that said second network node has dis-allocated said first circuit, and sending a sixth modified message to said first
20 network node to dis-allocate said first circuit, and

 wherein said call management node produces each of said fourth modified message, said fifth modified message and said sixth modified message, by replacing said destination identification code
25 with said unique identification code.

15. Network architecture for enabling a first network terminal which requests to establish a first call with a second network terminal over a first circuit, to increase a call-credit of a pre-paid account associated
30 with said first network terminal, when said call-credit is approaching zero, the network architecture comprising:

a first network node connected to said first network terminal;
a second network node connected to said second network terminal;

an account management node connected to said first network node, said account management node managing said pre-paid account; and

a call management node connected to said first network node via a first signaling link, to said second network node via a second signaling link, and to said account management node via a communication link, said call management node establishing a second call between said first network terminal and said account management node, for said first network terminal to increase said call-credit, said call management node terminating said second call when said call-credit is positive, and said call management node sending a first modified message to said second network node to allocate said first circuit,

wherein said call management node produces said first modified message by replacing a point code associated with said first network node, with another point code associated with said call management node.

16. The network architecture according to claim 15, wherein said call management node detects that said first network terminal is a pre-paid terminal, according to an originating identification code associated with said first network terminal,

wherein said call management node sends a first command to said account management node to check said call-credit,

wherein said account management node detects that said call-credit is approaching zero, and

wherein said account management node sends a second command to said call management node that said call-credit is approaching zero.

- 5 17. The network architecture according to claim 15, wherein said call management node establishes said second call, by sending a second modified message to said second network node to allocate said first circuit, receiving a first signaling message from said second network node that said second network node has allocated a second circuit
10 associated with said first circuit, and sending a first command to said account management node to allocate said second circuit,

wherein said call management node terminates said second call, by sending a third modified message to said second network node to dis-allocate said second circuit, sending a second command to said
15 account management node to dis-allocate said second circuit, receiving a second signaling message from said second network node that said second network node has dis-allocated said first circuit, and sending a fourth modified message to said first network node to dis-allocate said first circuit, and

20 wherein said call management node produces each of said second modified message, said third modified message and said fourth modified message, by replacing said destination identification code with said unique identification code.

- 25 18. The network architecture according to claim 15, wherein said call management node establishes said second call, by sending a second modified message to said second network node to allocate said first circuit, receiving a first signaling message from said second network node that said second network node has allocated a second circuit
30 associated with said first circuit, sending a third modified message to said first network node to allocate said second circuit, receiving a

second message from said first network node that said first network node has allocated a third circuit associated with said second circuit, and sending a first command to said account management node to allocate said third circuit,

5 wherein said call management node terminates said second call, by sending a fourth modified message to said first network node to dis-allocate said third circuit, sending a second command to said account management node to dis-allocate said third circuit, receiving a third signaling message from said first network node that said first
10 network node has dis-allocated said second circuit, sending a fifth modified message to said second network node to dis-allocate said second circuit, receiving a fourth signaling message from said second network node that said second network node has dis-allocated said first circuit, and sending a sixth modified message to said first
15 network node to dis-allocate said first circuit, and

 wherein said call management node produces each of said second modified message, said third modified message, said fourth modified message, said fifth modified message and said sixth modified message, by replacing said destination identification code
20 with said unique identification code.

19. Method for enabling a first network terminal connected in a call with a second network terminal via a first circuit, to purchase calling time during the call, the method comprising the procedures of:

25 sending a first modified message to a network node associated with said first network terminal, for said network node to allocate a second circuit, for connecting said first network terminal with an account management node over said second circuit, whereby said network node notifies said first network terminal of a waiting call from
30 said account management node;

receiving a signaling message from said network node that said first network terminal has accepted said waiting call;

5 sending a command to said account management node to initiate a pre-call procedure together with said first network terminal, over said second circuit, while said call at said network node over said first circuit, is on hold;

receiving a second indication from said account management node that said pre-call procedure is complete; and

10 sending a second modified message to said network node, for said network node to dis-allocate said second circuit, thereby enabling said first network terminal to resume said call with said second network terminal, over said first circuit.

15 20. The method according to claim 19, further comprising a preliminary procedure of receiving an indication from said account management node, that a call-credit of said first network terminal in said call, is approaching zero.

20 21. The method according to claim 20, further comprising a preliminary procedure of checking said call-credit.

25 22. The method according to claim 19, wherein each of said first modified message and said second modified message is produced, by replacing a destination identification code respective of said second network terminal, with a unique identification code respective of said account management node.

30 23. The method according to claim 19, wherein each of said first modified message and said second modified message is sent over a signaling link.

24. The method according to claim 19, wherein said command is sent over a communication link.

25. The method according to claim 19, wherein each of said first circuit and said second circuit is a circuit for transmitting voice.

26. Method for terminating a call between a first network terminal and a second network terminal over a first circuit, when a call-credit of a pre-paid account of the first network terminal is zero, the method comprising the procedures of:

 sending a first modified message to a second network node associated with said second network terminal, to dis-allocate said first circuit, thereby disconnecting said second network terminal from said second network node;

 sending a second modified message to said second network node, to re-allocate said first circuit for further directing said call to an account management node, for connecting said first network terminal with said account management node;

 sending a first command to said account management node to allocate a second circuit which is selected by said second network node, thereby connecting said first network terminal with said account management node over said first circuit and said second circuit;

 sending a third modified message to said first network node, to allocate a third circuit which is selected by said second network node, thereby connecting said first network node with said second network node over said first circuit and said third circuit;

 sending a second command to said account management node to allocate a fourth circuit which is selected by said first network node, thereby connecting said first network terminal with said account

management node, over said first circuit, said third circuit, and said fourth circuit;

 sending an explanatory message to said first network terminal for terminating said call; and

5 terminating said call.

27. The method according to claim 26, further comprising a preliminary procedure of receiving an indication from said account management node, that said call-credit is zero.

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28. The method according to claim 27, further comprising a preliminary procedure of checking said call-credit.

29. The method according to claim 26, further comprising a procedure of receiving a signaling message from said second network node, after performing said procedure of sending said first modified message, that said second network node has dis-allocated said first circuit.

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30. The method according to claim 26, further comprising a procedure of receiving a signaling message from said second network node, after performing said procedure of sending said second modified message, that said second network node has allocated said second circuit associated with said first circuit.

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31. The method according to claim 26, further comprising a procedure of receiving a signaling message from said first network node, after performing said procedure of sending said third modified message, that said first network node has allocated said fourth circuit associated with said third circuit.

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32. The method according to claim 26, wherein each of said first modified message, said second modified message, and said third modified message is sent over a signaling link.

5 33. The method according to claim 26, wherein said explanatory message is sent over a voice link.

34. The method according to claim 26, wherein said explanatory message is selected from the list consisting of:

10 an audio message;
 a graphical message; and
 a textual message.

15 35. The method according to claim 26, wherein each of said first command and said second command is sent over a communication link.

20 36. The method according to claim 26, wherein each of said first modified message, said second modified message, and said third modified message is produced by replacing a destination identification code associated with said second network terminal, with a unique identification code associated with said account management node.

25 37. The method according to claim 26, wherein each of said first circuit, said second circuit, said third circuit, and said fourth circuit is a circuit for transmitting voice.

30 38. Method for enabling a first network terminal which requests to establish a call with a second network terminal over a first circuit, to increase a call-credit of a pre-paid account associated with said first

network terminal, when said call-credit is approaching zero, the method comprising the procedures of:

5 sending a first modified message to a second network node associated with said second network terminal, to allocate said first circuit for further directing said call to an account management node, for connecting said first network terminal with said account management node;

10 sending a second modified message to said first network node to allocate a second circuit, following allocation of said second circuit by said second network node;

 sending a first command to said account management node to allocate a third circuit, following allocation of said third circuit by said first network node, thereby connecting said first network terminal with said account management node;

15 sending a second command to said account management node to allocate a fourth circuit which is selected by said second network node, thereby connecting said first network terminal with said account management node;

20 receiving a second indication from said account management node, that said call-credit is positive;

 sending a third modified message to said first network node, to dis-allocate said third circuit;

 sending a fourth modified message to said second network node, to dis-allocate said second circuit;

25 sending a fifth modified message to said second network node, to dis-allocate said fourth circuit; and

 sending a first signaling message to said second network node, to re-allocate said first circuit, following dis-allocation of said first circuit by said second network node, thereby connecting said first network terminal with said second network terminal.

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39. The method according to claim 38, further comprising a preliminary procedure of receiving an indication from said account management node, that said call-credit is insufficient for establishing said call.
- 5 40. The method according to claim 39, further comprising a preliminary procedure of checking said call-credit.
41. The method according to claim 40, further comprising a preliminary procedure of receiving a second signaling message from said first network node, that said first network terminal requests to establish
10 said call.
42. The method according to claim 38, further comprising a procedure of receiving a second signaling message from said second network node after performing said procedure of sending said first modified message, that said second network node has allocated said second
15 circuit.
43. The method according to claim 38, further comprising a procedure of receiving a second signaling message from said first network node after performing said procedure of sending said second modified message, that said first network node has allocated said third circuit.
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44. The method according to claim 38, wherein each of said first modified message, said second modified message, said third modified message, said fourth modified message, said fifth modified message and said first signaling message is sent over a signaling link.
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45. The method according to claim 38, wherein each of said first command, said second command and said second indication is sent
30 over a communication link.

46. The method according to claim 38, wherein each of said first modified message, said second modified message, said third modified message, said fourth modified message, and said fifth modified message, is produced by replacing a destination identification code associated with said second network terminal, with a unique identification code associated with said account management node.

47. The method according to claim 38, wherein each of said first circuit, said second circuit, said third circuit, and said fourth circuit is a circuit for transmitting voice.

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